Archiver Storage

Notes from the Extremely Large Database Conference

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Outline

- XLDB4
- Hadoop
- SciDB

XLDB4

- Extremely Large Databases
- 4th XLDB (first "open" conference)
  October 6-7, 2010
  SLAC
- **http://www-conf.slac.stanford.edu/xldb/**
- 158 Participants (with some neat industries)
  - Facebook
  - Yahoo!
  - Google
  - Cloudera

Hadoop

- Yahoo! and Cloudera and Facebook
  - Large community
- MapReduce
- Store data in Hadoop Distributed File System (HDFS)
  - Search files with Hive
- Or databases
  - HBase
  - Hypertable
- MapReduce: A major step backwards
  - http://databasecolumn.vertica.com/database-innovation/mapreduce-a-major-step-backwards/

SciDB

- Started Oct 2007 resulting from the first XLBD conference
- http://www.scidb.org/
- Led by Mike Stonebraker - MIT
- Advisory board
  - Jacek Becla - SLAC
  - Kian-Tat Lim - SLAC
- Open Source
- Main sponsor is Zetics, but owner is scidb.org (non-profit)

SciDB - Why

- Science people are unhappy with RDBMS
  - Main data types are arrays (inefficient in tables)
  - Three main features missing
    - provenance (lineage)
    - uncertainty
    - version control
  - SQL operations don't fit (need array operations, ie. regrid)

SciDB - What is it?

- Shared nothing cluster parallelism 10's–1000's of nodes
- Array Oriented Data Model
- Append-only storage w/ support for
  - named versions
  - lineage (what generated the data)
  - time travel (don't overwrite, keep everything)
- Support for User Defined Functions (UDFs)
- Massively Parallel Computations
- Simple continuous model of uncertainty

SciDB - Array Oriented Data Model

- Multi-dimensional arrays
  - Integer-indexed dimensions
  - Cells contain scalars, User Defined Types (UDTs), or another array
- Coordinate systems map from user-defined types to integer indices in enhanced arrays
- Ragged arrays allow each row/column to have a different dimensionality
- User-definable handling for ‘null’ or missing data

SciDB - AQL

- Array/analytics Query Language operation examples
  - Aggregate
  - Apply
  - Compose
  - Filter
  - Join (Combine)
  - Lookup
  - Project
  - Regid
  - Subsample
  - Multiple
  - Transpose
  - Or extend with UDFs

SciDB - When

- Currently at R0.5
  - download link should be up now (if not, I can get you a copy)
  - pre-beta (Proof of Concept)
  - still working on developer process for community
- R0.75 end of the year
  - AQL
  - Error handling
  - Scalable math operations
  - Better documentation
- R1.0 April 2011
  - More functionally complete (UDFs, uncertainty, provenance)
  - Robust high performance

Thank you!